भारतीय मानक
Indian Standard

IS 1231 : 2019

फुट माउंटेड इंडक्शन मोटर्स के आयाम और आउटपुट श्रृंखला — फ्रेम संख्या 56 से 315 एल

(चौथा पुनरीक्षण)

Dimensions and Output Series of Foot Mounted Induction Motors — Frame Numbers 56 to 315 L

(Fourth Revision)

ICS 29.160.01

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in   www.standardsbis.in

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FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Rotating Machinery Sectional Committee had been approved by the Electrotechnical Division Council.

This standard was first published in 1958 taking into consideration the agreement reached at the IEC level and the manufacturing practices in our country. At that time the standard was limited to the dimensions for foot mounted three-phase 50 Hz a.c. squirrel-cage motors of shaft heights ranging from 112 mm to 280 mm for general purpose applications and having enclosures for type of protection IP 21 or IP 22 (screen-protected or drip-proof construction) or both with Class A insulation.

The first revision was taken up in 1962 to extend the scope of this standard to cover motors of shaft heights ranging from 100 mm to 280 mm, motors having enclosures for type of protection IP 44 or superior (totally enclosed construction) and motors with Class E insulation.

In the second revision brought out in 1967, the important modification introduced was the assigning of higher outputs to the original frame sizes on the basis of experience gained in the country. In addition, dimensions for squirrel-cage motors having enclosures for type of protection IP 21 and IP 22 (screen-protected, drip-proof and drip-proof screen-protected en closures) with Class E insulation were also covered. Also fixing dimensions, details of bearing bore diameters, shaft extension dimensions with related maximum torque values, keyway dimensions and shaft run-out values were included.

The third revision was brought out in 1974 to incorporate the frame assignments for ac slip-ring (wound rotor) induction motors. Also, the values of tolerances for shaft extension, keys and keyways and values of related maximum torque for continuous duty were modified in line with IEC recommendations. Also, type of protection afforded by the enclosures and method of cooling were designated in accordance with IS/IEC 60035 (Part 5) and IS 6362 respectively.

This fourth revision has been undertaken to include the following:

a) Inclusion of updated latest Indian Standards referred in this standard.
b) Removal of Class A insulation and corresponding output Table 5 and Table 6 in the third revision of this standard, since industry has now switched over to minimum Class B level.
c) Removal of Class E insulation references in the third revision of this standard, since industry has now switched over to minimum Class B level.
d) Reference regarding aluminium as a conductor in winding, is eliminated since aluminium will result in lower efficiency.
e) Rated motor voltage is upgraded from 650 volts to 1 000 volts in line with IS 12615: 2018.
f) Frame designation with only frame size number and not with shaft extension diameter.
g) Motors with terminal box on side included.
h) 125 kW rating is replaced by 132 kW rating in line with Table 7 of IEC 60072-1 primary series.
j) Dimension K (diameter of hole) in foot are modified for frames 160, 180, 200, 215 in line with IEC 60072-1.

In the case of squirrel-cage motors having enclosures for type of protection IP 44 or superior (totally enclosed), and IP 21 and IP 22 (drip-proof), the outputs and shaft extension dimensions are different for the same frame sizes. This naturally results in different bearing sizes. Another notable point to be emphasized is that for the same type of enclosure for frame sizes where two outputs are specified, the higher shaft size is adopted thereby eliminating the necessity for having two shaft sizes for the same frame size.

The present trend in the manufacture of squirrel-cage motors is towards greater use of Class B and above insulation. Hence, Class A insulation motor dimensions in Table 5 and Table 6 of third revision have been eliminated. Also all references related to Class E insulation are eliminated.

This standard covers motors wound with copper conductors only.

Dimensions of foot-mounted single-phase induction motors are covered in IS 996 and dimensions of flange mounted ac induction motors are covered in IS 2223.

Performance requirements of motors covered by this standard shall be in accordance with IS 12615 and IS 15999 (Part 1).

In the preparation of this standard, assistance has been derived from IEC 60072 (Part 1): 1991 ‘Dimensions and output series for rotating electrical machines — Frame numbers 56 to 400 and flange numbers 55 to 1080’.

Indian Standard

DIMENSIONS AND OUTPUT SERIES OF FOOT MOUNTED INDUCTION MOTORS — FRAME NUMBERS 56 TO 315 L

(Fourth Revision)

1 SCOPE

This standard specifies the dimensions for foot-mounted three-phase 50 Hz a.c. induction motors of shaft height ranging from 56 to 315 mm, intended for general purpose applications. This standard also specifies the standard nominal output for squirrel-cage induction motors having enclosures for type of protection IP 21, IP 22 and IP 44 or superior (*see* IS/IEC 60034-5) for different frame sizes on the basis of Class 'B' insulation or higher class insulation (*see* IS 1271) and continuous rating in accordance with IS 15999 (Part 1).

It also covers the standard outputs and corresponding frame sizes and shaft extension diameters for slip-ring (wound rotors) continuous S1 duty rated motors, of shaft height ranging from 160 to 315 mm, for class of insulation not lower than Class 'B' (*see* IS 1271) and having enclosures for type of protection IP 21, IP 22 and IP 44 or superior (*see* IS/IEC 60034-5) for supply voltage not exceeding 1 000 volts.

2 REFERENCE

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed in Annex A.

3 LETTER SYMBOLS

For the purpose of this standard, the following (*see* **3.1**) letter symbols shall apply (*see* Fig. 1)

3.1 Letter Symbols for Dimension Sketches

A	Distance between centre lines of mounting holes (end view)
AA	Width of end of foot (end view)
AB	Overall dimension across feet (end view)
AC	Diameter of machine
AD	Distance from centre-line of machine to extreme outside of terminal box or other most salient object mounted on side of machine
B	Distance between centre line of fixing holes (side view)
BA	Length of foot (side view)
BB	Overall dimension across feet (side view)
C	Distance from shoulder on shaft to centre-line or mounting holes in the nearest feet
CA	Distance from shoulder on second shaft to centre line of mounting holes in the nearest feet
D	Diameter of shaft extension
DA	Diameter of the second shaft extension
E	Length of shaft extension from the shoulder
EA	Length of the second shaft extension from the shoulder
F	Width of keyway
FA	Width of keyway of tile second shaft extension
G	Distance from the bottom of keyway to the opposite surface of the shaft extension
GA	Distance from the top of the key to the opposite surface of the shaft extension
GB	Distance from the bottom of the keyway to the opposite surface of the second shaft extension
GC	Distance from the top of the key to the opposite surface of the second extension
GD	Thickness of key
GE	Depth of the keyway at the crown of the shaft
GF	Thickness of key of the second shaft extension
GH	Depth of keyway at the crown of the second shaft extension
H	Distance from centre line of shaft to bottom of feet (basic dimension)
HA	Thickness of feet
HG	Top of horizontal machine to bottom of feet

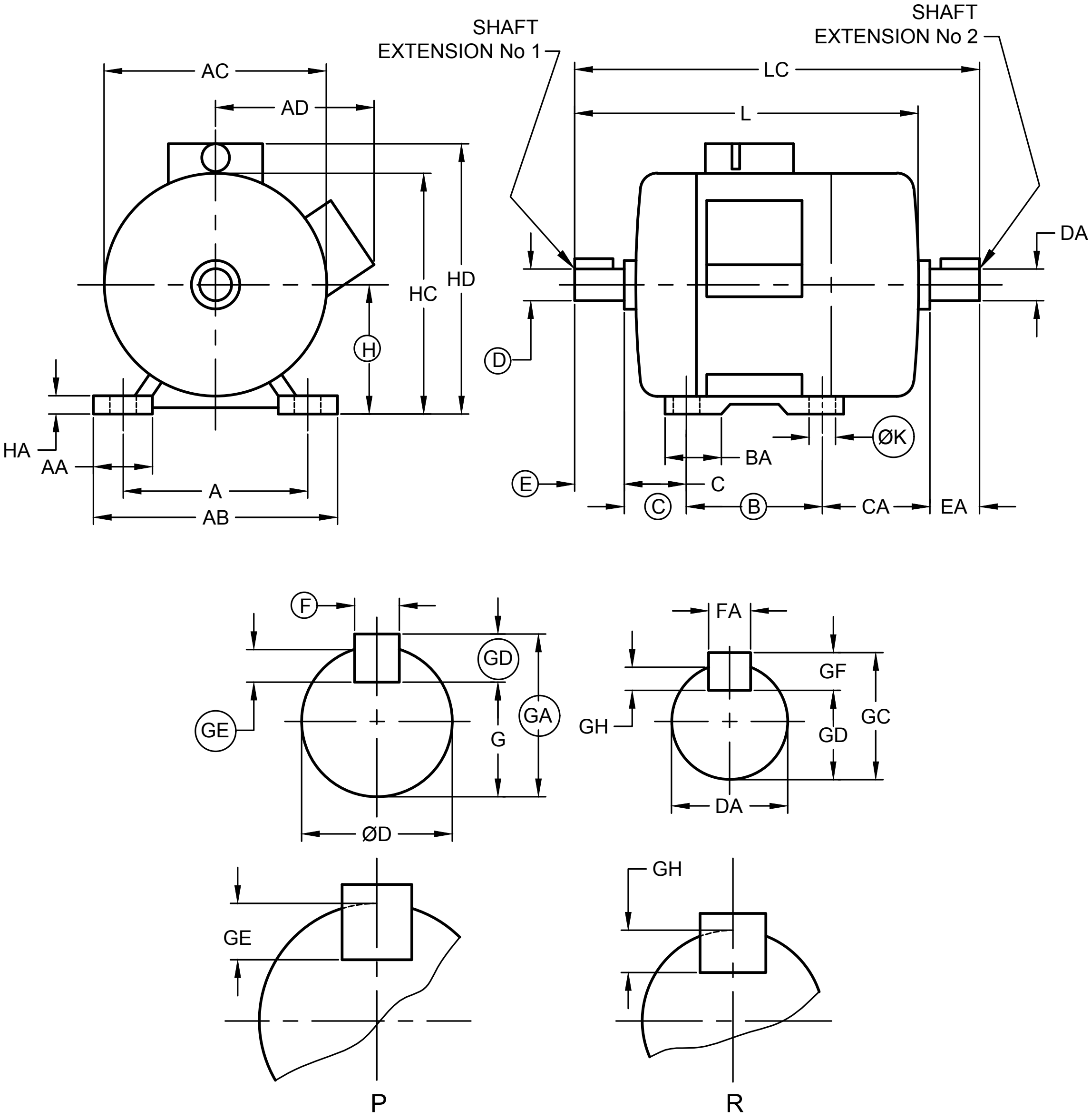
HD	Top of eye-bolt, terminal box or other most salient object mounted on top of the machine to bottom of feet
K	Diameter of holes or width of slots in the feet of the machine
L	Overall length of machine with single shaft extension
LC	Overall length of the machine when there is a second shaft extension

4 DESIGNATION OF MACHINE

Foot-mounted machines are to be designated by the frame number.

5 STANDARD FRAME SIZES AND DIMENSIONS

5.1 The basic dimensions for the frame sizes covered by this standard shall be as given in Table l read with Fig. 1.



P = End view of shaft extension No. 1

R = End view of shaft extension No. 2

NOTE 1 — Ringed symbols refer to dimensions which are specified in the standard. Unringed symbols are themselves standardized to facilitate reference when ordering motors to this specification.

NOTE 2 — The above sketch shows terminal box at angular position and on top. But terminal box can also be at right angles to motor base. (Refer **5.1**)

Fig. 1 Standardized and Otherdimensions for Foot-Mounted Motors

5.2 As basic information for the guidance of motor manufacturers, the maximum torque values at continuous rating for different shaft diameters are given in Table 2. Table 2 also gives the key and keyway dimensions.

6 POSITION OF TERMINAL BOX

The position of terminal box may be at suitable locations as indicated below.

6.1 The terminal box on a motor may be located with its centre line within a sector ranging from top to 10º below the horizontal centre-line, either on the right-hand side or left-hand side (as desired by the user), when looking at the driving end of the motor (this sector is shown with a blue dotted line in the sketch above).

6.2 Terminal box located on top is also acceptable.

NOTE — Provision should preferably be made so as to enable cable entry to the terminal box in any one of four directions at right angles.

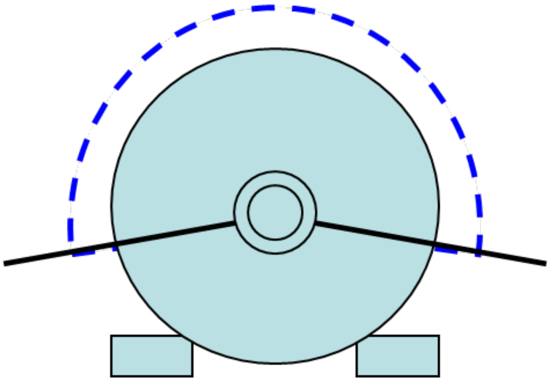


FIG. 2 LOCATION OF TERMINAL BOX

Table 1 Basic Dimension of Frame Sizes

(*Clause* 5.1)

Sl No.	Frame Number*	H		A	B	C	K+			Bolt or Screw
		Nominal	Maximum Deviation				Nominal	Tolerance + — +		
		mm	mm				mm	µm	µm	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1)	56	56	-0.5	90	71	36	5.8	+300	0	M5
2)	63	63	-0.5	100	80	40	7	+360	0	M6
3)	71	71	-0.5	112	90	45	7	+360	0	M6
4)	80	80	-0.5	125	100	50	10	+360	0	M8
5)	90 S	90	-0.5	140	100	56	10	+360	0	M8
6)	90 L	90	-0.5	140	125	56	10	+360	0	M8
7)	100 S	100	-0.5	160	112	63	12	+430	0	M10
8)	100 L	100	-0.5	160	140	63	12	+430	0	M10
9)	112 S	112	-0.5	190	114	70	12	+430	0	M10
10)	112 M	112	-0.5	190	140	70	12	+430	0	M10
11)	(112 L)	112	-0.5	190	159	70	12	+430	0	M10
12)	132 S	132	-0.5	216	140	89	12	+430	0	M10
13)	132M	132	-0.5	216	178	89	12	+430	0	M10
14)	(132 L)	132	-0.5	216	203	89	12	+430	0	M10
15)	(160 S)	160	-0.5	254	178	108	14.5	+430	0	M12
16)	160 M	160	-0.5	254	210	108	14.5	+430	0	M12
17)	160 L	160	-0.5	254	254	108	14.5	+430	0	M12
18)	(180 S)	180	-0.5	279	203	121	14.5	+430	0	M12
19)	180 M	180	-0.5	279	241	121	14.5	+430	0	M12
20)	180 L	180	-0.5	279	279	121	14.5	+430	0	M12
21)	(200 S)	200	-0.5	318	228	133	18.5	+520	0	M16

Table 1 (*Concluded*)

Sl No.	Frame Number*	H		A	B	C	K+			Bolt or Screw
		Nominal	Maximum Deviation				Nominal	Tolerance $\frac{+}{+}$		
		mm	mm				mm	µm	µm	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
22)	200 M	200	-0.5	318	267	133	18.5	+520	0	M16
23)	200 L	200	-0.5	318	305	133	18.5	+520	0	M16
24)	225 S	225	-0.5	356	286	149	18.5	+520	0	M16
25)	225 M	225	-0.5	356	311	149	18.5	+520	0	M16
26)	(225 L)	225	-0.5	356	356	149	18.5	+520	0	M16
27)	250 S	250	-0.5	406	311	168	24	+520	0	M20
28)	250 M	250	-0.5	406	349	168	24	+520	0	M20
29)	(250 L)	250	-0.5	406	406	168	24	+520	0	M20
30)	280 S	280	-1	457	368	190	24	+520	0	M20
31)	280 M	280	-1	457	419	190	24	+520	0	M20
32)	(280 L)	280	-1	457	457	190	24	+520	0	M20
33)	315 S	315	-1	508	406	216	28	+520	0	M24
34)	315 M	315	-1	508	457	216	28	+520	0	M24
35)	(315 L)	315	-1	508	508	216	28	+520	0	M24

* Frame numbers within brackets have not been utilized for assigning the standard outputs in Table 3 to Table 6 and shall be regarded as non-preferred for a.c. induction machines. These are given for information only.

+ Open-ended slots are not permitted. In case of small frames numbers up to 160 L, oblong holes may be provided for convenience in sliding the motor. The minimum length of oblong holes shall not be less than dimension ‘K for circular holes. The tolerances on dimensions of oblong holes are not applied.

$\frac{+}{+}$ These tolerances are those given in coarse series H14 according to IS 1821.

NOTE — The tolerance on dimensions A, B and C shall be applied in accordance with coarse class tolerance specified in IS 2102 (Part 1).

7 STANDARD OUTPUTS

7.1 The frame number and shaft extension diameter for the standard nominal output ratings for ac three-phase 50 Hz squirrel-cage motors with continuous ratings at voltages of 1 000 V or less, shal1 be as given in Table 3 and Table 4.

7.2 The frame number and shaft extension diameter for the standard nominal output ratings for a.c. three-phase 50 Hz slip ring (wound rotor) with continuous ratings at voltages of 1 000 V or less shall be as given in Table 5 and Table 6.

7.3 These outputs are on the basis of continuous duty as defined in IS 15999 (Part 1).

7.4 For output ratings other than continuous duty, the choice of frame size shall be a matter of agreement between the manufacturer and the purchaser.

7.5 For site conditions other than those specified in **4** of IS 12615, the choice of frame size shall be a matter of agreement between manufacturer and the purchaser.

8 FRAME NUMBER

The frame numbers consist of two parts, the first part giving values corresponding to the actual shaft heights and the second part giving letters indicating the frame lengths, the letter ‘S’ being for short motor, ‘M’ for medium motor and ‘L’ for long motor.

Table 2 Shaft Extension Dimensions, Keys and Keyways and Maximum Permissible Torque Values for Continuous Duty Motors

(*Clause* 5.2)

Sl No.	**Shaft**				**Key**					**Keyway**					**GA Nominal** α mm	**Maximum Torque for Continuous Duty on a.c. Motors** β Nm
	D*			**E**	**F**		**GD**			**F**			**GE**			
	Nominal mm	**Tolerances**														
		Designations	**µm**		**Nominal mm**	**Tolerances µm**	**Nominal mm**	**Tolerances**								
								Designation	**µm**	**Nominal mm**	**Tolerances N9 ++ µm**	**Tolerances P9 ++ µm**	**Nominal mm**	**Tolerances µm**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1)	7	j6	+7 -2	16	2	0 -25	2	h9	0 -25	2	-4 -29	-6 -31	1.2	+100 0	7.8	0.25
2)	9	j6	+7 -2	20	3	0 -25	3	h9	0 -25	3	-4 -29	-6 -31	1.8	+100 0	10.2	0.63
3)	11	j6	+8 -3	23	4	0 -30	4	h9	0 -30	4	0 -30	-12 -42	2.5	+100 0	12.5	1.25
4)	14	j6	+8 -3	30	5	0 -30	5	h9	0 -30	5	0 -30	-12 -42	3	+100 0	16	2.8
5)	16	j6	+8 -3	40	5	0 -30	5	h9	0 -30	5	0 -30	-12 -42	3	+100 0	18	4.1
6)	18	j6	+8 -3	40	6	0 -30	6	h9	0 -30	6	0 -30	-12 -42	3.5	+100 0	20.5	7.1
7)	19	j6	+9 -4	40	6	0 -30	6	h9	0 -30	6	0 -30	-12 -42	3.5	+100 0	21.5	8.25
8)	22	j6	+9 -4	50	6	0 -30	6	h9	0 -30	6	0 -30	-12 -42	3.5	+100 0	24.5	14
9)	24	j6	+9 -4	50	8	0 -36	7	h11	0 -90	8	0 -36	-15 -51	4	+200 0	27	18
10)	28	j6	+9 -4	60	8	0 -36	7	h11	0 -90	8	0 -36	-15 -51	4	+200 0	31	31.5
11)	32	k6	+18 +2	80	10	0 -36	8	h11	0 -90	10	0 -36	-15 -51	5	+200 0	35	50
12)	38	k6	+18 +2	80	10	0 -36	8	h11	0 -90	10	0 -36	-15 -51	5	+200 0	41	90
13)	42	k6	+18 +2	110	12	0 -43	8	h11	0 -90	12	0 -43	-18 -61	5	+200 0	45	125

Table 2 (*Concluded*)

Sl No.	Shaft				Key					Keyway					GA Nominal α mm	Maximum Torque for Continuous Duty on a.c. Motors β Nm
	D*			E	F		GD			F			GE			
	Nominal mm	Tolerances			Nominal mm	Tolerances µm	Nominal mm	Tolerances		Nominal mm	Tolerances N9 ++ µm	Tolerances P9 ++ µm	Nominal mm	Tolerances µm		
		Designations	µm					Designation	µm							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
14)	48	k6	+18 +2	110	14	0 -43	9	h11	0 -90	14	0 -43	-18 -61	5.5	+200 0	51.5	200
15)	55	m6	+30 +11	110	16	0 -43	10	h11	0 -90	16	0 -43	-18 -61	6	+200 0	59	355
16)	60	m6	+30 +11	140	18	0 -43	11	h11	0 -110	18	0 -43	-18 -61	7	+200 0	64	450
17)	65	m6	+30 +11	140	18	0 -43	11	h11	0 -110	18	0 -43	-18 -61	7	+200 0	69	630
18)	70	m6	+30 +11	140	20	0 -52	12	h11	0 -110	20	0 -52	-22 -74	7.5	+200 0	74.5	800
19)	75	m6	+30 +11	140	20	0 -52	12	h11	0 -110	20	0 -52	-22 -74	7.5	+200 0	79.5	1000
20)	80	m6	+30 +11	170	22	0 -52	14	h11	0 -110	22	0 -52	-22 -74	9	+200 0	85	1250
21)	85	m6	+35 +13	170	22	0 -52	14	h11	0 -110	22	0 -52	-22 -74	9	+200 0	90	1600
22)	90	m6	+35 +13	170	25	0 -52	14	h11	0 -110	25	0 -52	-22 -74	9	+200 0	95	1900
23)	95	m6	+35 +13	170	25	0 -52	14	h11	0 -110	25	0 -52	-22 -74	9	+200 0	100	2300

* For diameter up to 25 mm, a shoulder of 0.5 mm is considered sufficient.

++ The keyway tolerance N9 applies for normal keys and P9 for fitted keys.

α Tolerance for GA may be calculated from tolerances values of the D, GE and GD dimensions.

β The torque values are chosen from series R 40.

Table 3 Frame Number and Shaft Extension Diameter for Squirrel-cage Foot-mounted Motors having Enclosures for Type of Protection IP 44 or Superior [see IS /IEC 60034 (Part 5)] and Method of Cooling IC 411 (see IS 6362) with Class 'B' Insulations or Higher

(*Clause* 7.1)

All dimensions in millimeters

Sl No.	Output Rating in kW for Synchronous Speed (rev/ min)				Frame * Number	Shaft Extension Diameter + for Synchronous Speed (rev/min)			
	3 000	1 500	1 000	750		3 000		1500 and below	
						size	Tolerance	Size	Tolerance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1)	0.09 and 0.12	0.06 and 0.09	—	—	56	9	J6	9	J6
2)	0.18 and 0.25	0.12 and 0.18	—	—	63	11	J6	11	J6
3)	0.37 and 0.55	0.25 and 0.37	—	—	71	14	J6	14	J6
4)	0.75 and 1.1	0.55 and 0.75	0.37 and 0.55	—	80	19	J6	19	J6
5)	1.5	1.1	0.75	0.37	90S	24	J6	24	J6
6)	2.2	1.5	1.1	0.55	90L	24	J6	24	J6
7)	3.7	2.2	1.5	0.75 and 1.1	100L	28	J6	28	J6
8)	—	3.7	2.2	1.5	112M	28	J6	28	J6
9)	5.5 and 7.5	5.5	3.7	2.2	132S	38	k6	38	k6
10)	—	7.5	5.5	—	132M	38	k6	38	k6
11)	11 and 15	11	7.5	3.7 and 5.5	160M	42	k6	42	k6
12)	18.5	15	11	7.5	160L	42	k6	42	k6
13)	22	18.5	—	—	180M	48	k6	48	k6
14)	—	22	15	11	180L	48	k6	48	k6
15)	30 and 37	30	18.5 and 22	15	200L	55	m6	55	m6
16)	—	37	—	18.5	225S	55	m6	60	m6
17)	45	45	30	22	225M	55	m6	60	m6
18)	55	55	37	30	250M	60	m6	65	m6
19)	75	75	45	37	280S	65	m6	75	m6
20)	90	90	55	45	280M	65	m6	75	m6
21)	110	110	75	55	315S	65	m6	80	m6
22)	132	132	90	75	315M	65	m6	80	m6

* For basic dimension of frame, reference shall be made to Table 1.

+ For other data on shaft extension, *see* Table 2.

Table 4 Frame Number and Shaft Extension Diameter for Squirrel-cage Foot – mounted Motors having Enclosures for Type of Protection IP 21 and IP 22 [*see* IS /IEC 60034 (Part 5)] and Method of Cooling IC 411 (*see* IS 6362) with Class 'B' Insulations or Higher

(*Clause* 7.1)

All dimensions in millimeters

Sl No.	**Output Rating in kW for Synchronous Speed (rev/min)**				**Frame * Number**	**Shaft Extension Diameter + for Synchronous Speed (rev/min)**			
	3 000	1 500	1 000	750		3 000		1500 and below	
						size	Tolerance	Size	Tolerance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1)	0.09 and 0.12	0.06 and 0.09	—	—	56	9	J6	9	J6
2)	0.18 and 0.25	0.12 and 0.18	—	—	63	11	J6	11	J6
3)	0.37 and 0.55	0.25 and 0.37	—	—	71	14	J6	14	J6
4)	0.75 and 1.1	0.55 and 0.75	0.37 and 0.55	—	80	19	J6	19	J6
5)	1.5	1.1	0.75	0.37	90S	24	J6	24	J6
6)	2.2	1.5	1.1	0.55	90L	24	J6	24	J6
7)	—	2.2	1.5	0.75 and 1.1	100L	28	J6	28	J6
8)	3.7	3.7	2.2	1.5	112M	28	J6	28	J6
9)	5.5 and 7.5	5.5	—	2.2	132S	38	k6	38	k6
10)	—	7.5	3.7 and 5.5	—	132M	38	k6	38	k6
11)	11 and 15	11	7.5	3.7 and 5.5	160M	48	k6	48	k6
12)	18.5 and 22	15 and 18.5	11	7.5	160L	48	k6	48	k6
13)	30	22	15	11	180M	55	m6	55	m6
14)	37	30	18.5	15	180L	55	m6	55	m6
15)	45	37	22	18.5	200M	60	m6	60	m6
16)	55	45	30	22	200L	60	m6	60	m6
17)	75	55	37	30	225M	60	m6	65	m6
18)	90	75	45	37	250S	65	m6	75	m6
19)	110	90	55	45	250M	65	m6	75	m6
20)	—	110	75	55	280S	65	m6	80	m6
21)	132	132	90	75	280M	65	m6	80	m6
22)	160	160	110	90	315S	70	m6	90	m6
23)	180 and 200	180 and 200	132	110	315M	70	m6	90	m6

* For basic dimension of frame, reference shall be made to Table 1.

+ For other data on shaft extension, *see* Table 2.

Table 5 Frame Number and Shaft Extension Diameter for Slip-ring (Wound Rotor) Continuous Rated Motors having Enclosures for Type of Protection IP 44 or Superior [see IS/IEC 60034 (Part 5)], and Method of Cooling IC 411 (see IS 6362) and Class of Insulation not Lower than Class 'B'

(*Clause* 7.2)

All dimensions in millimetre

Sl No.	Output Rating in kW for Synchronous Speed (rev/min)			* Frame Number	+ Shaft Extension
	1500	**1000**	**750**		
	(1)	(2)	(3)	(4)	(5)
1)	7.5	5·5		160 M	42
2)	11	7-5	5·5	160 L	42
3)	15	11	7·5	180 L	48
4)	18·5 and 22	15	11	200 L	55
5)	30	18·5 and 22	15 and 18·5	225 M	60
6)	37 and 45	30	22	250 M	65
7)	55	37	30	280 S	75
8)	75	45	37	280 M	75
9)	90	55	45	315 S	80
10)	110	75	55	315 M	80

* For basic dimension of frame, reference shall be made to Table 1

+ For other data on shaft extension, *see* Table 2.

Table 6 Frame Number and Shaft Extension Diameter for Slip-ring (Wound Rotor) Continuous Rated Motors having Enclosures for Type of Protection, IP 21 and IP 22 [IS/IEC 60034 (Part 5)], Method of Cooling, IC 01 (see IS 6362) and Class of Insulation not Lower than Class 'B'

(*Clause* 7.2)

All dimensions in millimetre

Sl No	Output Rating in kW for Synchronous Speed (rev/min)			* Frame Number	+ Shaft Extension
	1500	1000	750		
	(1)	(2)	(3)	(4)	(5)
1)	7·5	5.5	3·7	160 M	48
2)	11 and 15	7.5	5.5	160 L	48
3)	18·5	11	7.5	180 M	55
4)	22	15	11	180 L	55
5)	30	18·5	15	200 M	60
6)	37	22	18·5	200 L	60
7)	45 and 55	30 and 37	22 and 30	225 M	65
8)	7S	45	37	250 S	75
9)	90	55	45	250 M	75
10)	110	75	55	280 S	80
11)	125	90	75	280 M	80
12)	160	110	90	315 S	90
13)	200	125	110	315 M	90

* For basic dimension of frame, reference shall be made to Table 1.

+ for other data on shaft extension, *see* Table 2.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1271 : 2012	Electrical insulation-thermal evaluation and designation
1821 : 1987	Dimensions for clearance holes for bolts and screws (third revision
2102 (Part 1) : 2013	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*)
2223 : 1983	Dimensions of flange mounted ac induction motors
6362 : 1995	Designation of methods of cooling of rotating electrical machines
12615 : 2018	Line operated three phase a.c. motors (IE CODE) "efficiency classes and performance specification" (*third revision*)
IS/IEC 60034 (Part 5) : 2000	Rotating electrical machines: Part 5 Degrees of protection provided by the integral design of rotating electrical machines (IP code) — Classification
IS 15999 (Part 1) : 2016	Rotating electrical machines: Part 1 Rating and performance (*first revision*)

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices: *Telephones*

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
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Northern : Plot No. 4-A, Sector 27-B, Madhya Marg
CHANDIGARH 160019 265 0206, 265 0290

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113 2254 1216, 2254 1442, 2254 2519, 2254 2315

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